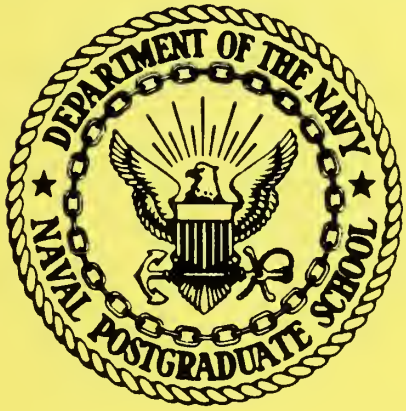
NPS-54-86-013

NAVAL POSTGRADUATE SCHOOL
Monterey, California



PROMOTIONS, PAY, PERFORMANCE

RATINGS AND QUITS

by

Loren M. Solnick

October 1986

Approved for public release; distribution unlimited.

Prepared for: Chief of Naval Research
Arlington, VA 22217-5000

NAVAL POSTGRADUATE SCHOOL
Monterey, California

RADM. R. C. Austin
Superintendent

David A. Schrady
Provost

The research summarized herein was accomplished with resources provided by the Naval Postgraduate School Foundation Research Program.

This report was prepared by:

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release
2b DECLASSIFICATION / DOWNGRADING SCHEDULE	
4 PERFORMING ORGANIZATION REPORT NUMBER(S) NPS54-86-013	5 MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION Naval Postgraduate School — 6b OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION Chief of Naval Research
6c ADDRESS (City, State, and ZIP Code) Monterey, CA 93943	7b ADDRESS (City, State, and ZIP Code) Arlington, VA 22217-5000
8a. NAME OF FUNDING / SPONSORING ORGANIZATION N.P.S. Research Foundation — 8b OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER N0001486WR4E001
8c. ADDRESS (City, State, and ZIP Code)	10 SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO	PROJECT NO	TASK NO.	WORK UNIT ACCESSION NO
61152N	RR000-01	10P3-009	See 9

11 TITLE (Include Security Classification)

"Promotions, Pay, Performance Ratings and Quits" (Unclassified)

12. PERSONAL AUTHOR(S)
Loren Solnick

13a. TYPE OF REPORT	13b TIME COVERED FROM _____ TO _____	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
		October, 1986	25

16 SUPPLEMENTARY NOTATION

17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Quit behavior; turnover

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The study investigates the determinants of quits among professional and managerial employees of a large manufacturing firm. The major hypothesis is that the heterogeneity of the sample gives rise to non-competing groups, which have different promotion rates, and that the absence of promotion increases the probability of quitting. The theory is tested on a sample of about 8500 whites males. Absence of promotion is found to significantly increase the probability of quitting. However, among more homogeneous subsamples of employees, defined by either major field of study or functional area of employment, the promotion effect is much smaller, and mostly not significant. The results support the basic thesis of the study, although the small size of some subsamples may have contributed to the lack of a significant promotion effect.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION	
☐ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS		
22a. NAME OF RESPONSIBLE INDIVIDUAL	22b TELEPHONE (Include Area Code)	22c. OFFICE SYMBOL

PROMOTIONS, PAY, PERFORMANCE RATINGS AND QUITS

by

Loren M. Solnick
Associate Professor
Dept. of Administrative Sciences
Naval Postgraduate School
Monterey, CA 93943
408-646-2249

October, 1986

The author would like to thank Steve Mehay, Aline Quester and George Thomas for Comments on an earlier draft. This research was supported by the Naval Postgraduate School Foundation Research Program.

1 Introduction

This study investigates the determinents of quits among profe sional and managerial employees of a large manufacturing firm. It the first study of these types of employees to utilize detail personnel data to investigate the influence of recent promotions, p and performance ratings on quit behavior.[1] The role of recent prom tions is emphasized below, where it is argued that the firm's interna labor market is segmented into non-competing groups, based on educa tional background and organizational experience and training. Thi segmentation, and the stochastic nature of promotional opportunities results in unequal promotion probabilities among equally abl employees. Two testable hypotheses emerge from this model: (1 absence of recent promotion will, ceteris paribus, increase th likelihood of a quit; and (2) the more homogeneous the group o employees studied the smaller this effect will be. If the firs hypothesis is correct it is a serious concern for management, since th increased quit rate is both costly and, given the nature of th problem, difficult to change.

Below, models of quit rates are estimated for both the complet sample of employees and for sub-samples of employees defined by th factors that segment the internal labor market. Estimates of th effect of promotions on quits among the subsamples suggest whethe those factors have produced unequal promotional opportunities tha encouraged quits. For the entire sample of almost 8,500 employees absence of recent promotion significantly increases the likelihood o

quitting. Moreover, the estimates for the subsamples show that in most cases, among the more homogeneous groups of employees, recent promotion has no significant effect on quit probabilities.

The balance of this paper is organized as follows: in the second section some of the recent literature on quit behavior is reviewed, and a quit model that incorporates the concepts of a segmented internal labor market and a stochastic promotion process is formulated; in the third section the personnel data used and the variables created are described; in the fourth section the parameter estimates of the various models are presented; the last section contains some concluding remarks.

II. Models of Quit Behavior

Economists have only recently begun to study quit behavior within organizations, although a substantial body of research on the subject can be found in psychology and management journals (Arnold and Feldman, Dreher, Keller, Scholl). This organizational research generally focuses on job satisfaction as a major determinant of quitting; job satisfaction depending on satisfaction with pay, promotions, supervision and work content. Other important factors are perceived external opportunities and organizational commitment (Scholl), and performance and absenteeism (Dreher, Keller). Keller for example, found that low performance ratings were associated with high turnover rates. Findings that low pay, poor perceived promotional opportunities, or low performance ratings increase quits is consistent with both economic and job satisfaction models of turnover.

Economic research has moved from studies of turnover rates using

industry data (Parsons), to studies utilizing longitudinal survey dat or personnel records of firms, to investigate individual quit behavio The recent studies that use longitudinal data have been concerned wi race and gender differences in quit rates (Blau and Kahn, Viscus Meitzen), or with testing human capital and job match theories quitting (Mincer and Jovanovic, Miller). Other recent work has sho that non-portable pension benefits reduce quit rates (Mitchell,1982).

Recently, Weiss studied quit behavior among newly hired producti workers of a manufacturing firm. Weiss' model includes variables th represent expected alternative wages (i.e. human capital variables job satisfaction, and the cost of quitting. He found that high scho graduates and those employed when they applied for work at the subje firm were significantly less likely to quit during the first six mont on the job. On the other hand, whites and those with more complex jo were significantly more likely to quit. Blue collar workers appear n to enjoy more complex jobs.

The present study analyzes the quit behavior of a diverse group professional and managerial employees of a major manufacturing firm The heterogeneity of the sample suggests a model of job quitting tha incorporates the idea of a segmented internal labor market. Althou the data set does not contain direct information on job satisfactio the wage and job histories of the employees, as well as their persona attributes, provide a rich basis for analyzing the determinants o quit behavior.

A simple economic model of quit behavior can be based on utilit maximization. In each time period (a one year period is used here)

each employee compares the present value of the expected lifetime utility of his current job with that of his other alternatives, including leisure.[2] If the discounted expected utility of any alternitive is greater than the cost of quitting plus the discounted expected utility of the current job, the employee quits.

(1) $Q = 1$ if $V(U_j) > V(U_o) + C$ (employee quits)

$= 0$ if $V(U_j)$ $V(U_o) + C$ (employee does not quit)

where

$V(U_j)$ = discounted expected lifetime utility of alternate job j, $j=1, \ldots, n$

$V(U_o)$ = discounted expected lifetime utility of current job

C = cost of quitting

Since the expected utilities (and the cost of quitting) are not directly observable, the empirical model necessarily relies on proxy variables. $V(U_j)$ depends primarily on the personal attributes of the employee that affect his productivity. Since the job market for each occupation will generate a different distribution of wage offers, variables that represent occupation are included in the model. Note that $V(U_o)$ also depends on personal attributes, as well as on management decisions, and various aspects of the specific job that determine job satisfaction. Management decisions with respect to pay, performance ratings and promotions are signals that the employee translates into expectations about future progress within the firm. The cost of quitting depends on personal risk preferences with respect to job stability vs. job change, the extent of family responsibilities, and vested,non-portable pension benefits. The specific variables that

proxy for these factors in the empirical analysis are discussed in next section.

The preceding discussion states that some personal attributes w influence both $V(U_j)$ and $V(U_o)$. Since these effects are not obse able, the effect of these personal attributes on the quit probabil depends the relative size of the two effects. For attribute X_i, implies

$$\partial Q/\partial X_i = \partial V(U_j)/\partial X_i - \partial V(U_o)/\partial X_i$$

Attributes that represent general training (e.g. educatio attainment and prior work experience) are the likely candidates f this situation, since that type of training raises productivity (a presumably compensation) equally among all employees. Weiss, f example, found that years of schooling was negatively related to qu propensity, that a variable that proxied for the better job altern tives associated with increased educational attainment was positive (but not significantly) related to quit propensity.

The empirical model is derived from (1) by positing the followi relationships:

(2) $V(U_j) = f(X_i)$

(3) $V(U_o) = g(X_i, W_j)$

(4) $C = h(Z_t, R, e)$

Where X_i = personal attributes that affect productivity

W_j = job characteristics and management signals that determine satisfaction with and expected future values of current job

Z_t = variables reflecting family responsibilities

R = vested, non-portable pension benefits (assumed to depend on length of job tenure)

e = personal risk preference (a normally and independently distributed random variable)

The emphasis in this study is on the impact on quits of management signals, i.e., pay, performance ratings, and promotions. These are policy variables for the firm. The expected effect of pay is clear: higher wages should reduce quitting, since it increases $V(U_o)$ relative to the alternatives $V(U_j)$: The argument with regard to performance ratings is more subtle. Better performers may have more attractive employment opportunities outside the firm to balance the expected bright future with their current employer. However, internal performance appraisals are likely to have more value within the firm than to external observers, to whom the appraisal process is not well known. Thus logic suggests that good performance will enhance the expected returns at the present job more than at alternative jobs, and thus reduce the quit propensity.

The role of promotions is complex, because they depend not only on the ability and skills of the employees, but also on the existence of openings for which they are qualified. Random events, beyond management control, create different promotional opportunities across the firm (Wise). Vacancies occur randomly due to quits, unexpected retirements, deaths or disabilities, or unequal rates of expansion or contraction of different components of the firm.

If the firm operated as a single internal labor market, the ran aspect of promotional opportunities would cause no problems. The m able employee eligible for each vacancy would be promoted.[3] Howev if the firm's internal labor market is segmented into non-compet groups, with limited mobility among them, then promotion rates will be equalized among equally able employees. In other words, "being the right place at the right time" can effect promotion probabilitie

Why should the firm have a segmented internal labor market? underlying reason is the heterogeneity of its professional and ma gerial work force. In most cases, engineers are not substitutes accountants, nor are marketing managers for production manager Differences in educational background and work assignments give rise differences in specific training, which create non-competing groups.[4]

Table 1 sheds some light on the variance in promotion rates at t subject firm in 1980. Table 1 presents the percent of employe promoted during the year by major field of study and functional div sion, by most recent performance rating (the highest rating is 5, t lowest is 2). The table shows a wide variation in promotion rat across majors and functions within each performance rating grou Table 1 also shows the expected monotonic decline in promotion rat across performance rating groups.

If, as hypothesized, absence of recent promotion increases qu propensity, the cost of the segmented labor market will be increas turnover. Moreover, the specialization of labor that gives rise to t segmentation is not something a large, complex firm can easily reduc nor will it necessarily find it desirable to do so.

If promotion rates were equal among equally qualified employees, and all the relevant factors that enter the promotion decision could be accurately measured, then a promotion dummy variable would be redundant in a quit model that included those factors. However, the random occurrence of vacancies, and the fact that all the factors that determine promotion rates cannot be measured, implies that promotion probability will have an independent effect on the quit probability.

In the case of stochastic promotion probabilities, the probability of being promoted (P) can be express as:

$$(5)\quad P = \alpha_i X_i + \beta_j W_j + u$$

where X and W are the personal and job related factors defined above (with promotions deleted from W), and u is a random disturbance that accounts for the stochastic factors beyond management control and the factors the analyst cannot measure. Now, omitting P from the model reduces the model's explanatory power, and may also produce biased parameter estimates for the variables correlated with P. Therefore, a variable reflecting recent promotion experience is included in the model.

The heterogeneity of labor in the firm plays a key role in the influence of promotions on voluntary separations. The more homogeneous the group of employees, the less will be the within group variance in promotion rates, ceteris paribus, because the employees are closer substitutes. Therefore, the impact of promotions on quits should be smaller among more homogeneous groups of employees. Below quit models are estimated for both the entire sample of employees, and for subsamples of more homogeneous employees. The subsamples are defined

by major field of study for highest degree attained, and by functi division of the firm. If the labor market segmentation hypothesis correct, these factors are most likely to give rise to differences promotion probabilities, so estimates of the promotion effect on qu should be most sensitive to these groupings.

Using the symbols defined above, the empirical model is obtai by substituting (2), (3), and (4) into (1).

(6) $Q = f(X_i, W_j, Z_t, R, e)$

The vector W_j includes variables that measure pay, performance rati and recent promotion, as well as location among the firm's functio divisions and pay grades. The specific variables are described fu in the next section.

One aspect of the model presented here warrants further disc sion. Although most models of quit behavior include a measure of tenure(Blau and Kahn, Viscusi, Keller, Mitchell (1982)), Weiss h argued that it is endogenous to a quit model, and its inclusion resul in sample selection bias. In effect, longer service employees a those who each year choose not to quit, and thus are assumed to have different average value for risk preference than employees with short service. Thus the error term in the quit model is correlated wi years of service, resulting in biased parameter estimates for t service variables, and for the other variables in the model correlat with length of service (which will be all the variables correlated wi quits, if this view is correct).

The selection bias argument rests on the assumption that there a unmeasured personal attributes that affect both length of service a

annual quit probability. The sample selection criteria used here deletes from the study both short and long term employees, two groups which should and do have different quit probabilities than the balance of the employees.[5] Job-matching theory (Miller, Mincer and Jovanovic) suggests that in their first few years of service employees go through an evaluation period, during which the true nature of their job is revealed. The high rate of separations among short tenure employees reflects decisions based on information about the job that could only be obtained after employment. Individuals who find a poor match with their expectations thus have a very high likelihood of quitting. Employees with less than three years of service were deleted from the study.

On the other hand, the quit behavior of long service employees is often influenced by health and retirement considerations. Since quit rates rise sharply after about 25 years of service, employees with more than that much service were also deleted from the study. Thus the employees in this study are clearly more homogeneous with respect to obvious unmeasured attributes that influence quit behavior than all the employees of the firm. The potential bias that remains is evaluated below.

III. Data and Variables

The data used in this study were drawn from the personnel file of a large U.S. manufacturing firm. To limit the scope of the study, and avoid possible racial and sexual differences in job mobility preferences, the sample was restricted to white males. The sample was further limited to professional and managerial employees (exempt under

the Fair Labor Standards Act) who were hired at least one year prior January 1, 1981, the beginning of the year studied. These restricti resulted in a sample of over 9,000 employees.

Preliminary tabulations revealed that the separation rates am employees with the lowest performance rating ("unsatisfactory") w over 90%. These terminations were judged not to be truly volunt separations.[6] Therefore, the very low performers, along with t employees with very short or very long lengths of service, were delet from the study. After deletions from missing data the sample consist of 8424 employees.

The variables used in the empirical analysis are defined belo They are grouped into three categories, corresponding to the vectors W and Z, and length of service.

1. Personal attributes affecting productivity.

a. Previous experience (and its square): The estimated years i the labor force between receipt of bachelor's degree and date o employment at the firm. It is reduced by two years for receipt of master's degree and five years for receipt of a doctorate.

b. Educational attainment: Two dummy variables for receipt of a master's or a doctorate (all employees in the sample had at least a bachelor's degree).

c. Major field of study: A set of eight dummy variables reflec ting the field of the person's highest degree (see Table 1 for th fields; employees with engineering degrees, and those with scienc degrees, were each aggregated into a single group.)

2. Job characteristics

a. Grade level: Two dummy variables indicating employment in (1) the lowest two salary grades or (2) the third salary grade, as of 1/1/81.

b. Performance ratings: Three dummy variables indicating the rating received most recently prior to 1/1/81. The lowest rating included in the study (satisfactory) is the omitted reference group.

c. Salary: The ratio of the individuals's salary to the mean salary in his salary grade. This relative measure seemed most appropriate in representing the signals management gives employees. This is the comparison that the employee will find most revealing of his apparent worth to the firm.

d. Salary change: The percentage increase in salary between 1/1/78 and 1/1/81. This variable is another management signal that may affect separation decisions.

e. Functional area: Is a set of dummy variables to distinguish jobs among the major operating divisions of the firm (see Table 1).

f. Promotion: A dummy variable to identify employees who received a promotion during 1980, the year prior to that studied. Promotion was defined as an increase in salary grade level.

3. Family responsibility

a. Marital status: A dummy variable to distinguish married (1) versus single (0) employees.

b. Children: A dummy variable that has the value of one for married employees with children under age 18 in the household, and is zero otherwise.

4. Length of Service (and its square): Measured from date of emplo ment to January 1, 1981.

IV. Empirical Findings

In this section I report the parameters estimated for equati (6). First, the model is estimated for the entire sample of 84 employees. Then estimates were made for three groups of subsample defined by major field of study, functional area within the firm, a performance rating. The first two groups test the labor mark segmentation hypothesis, showing whether the promotion variable has smaller, less significant impact on quits among the more homogeneo groups of employees than for the sample as a whole. The latter gro tests whether the promotion effect is constant across all performanc ratings. There is reason to believe that employees with high perfor ance ratings will be less sensitive to absence of promotion tha employees with lower ratings. The better performers may realize, a may have been informed by their superiors, that the absence of promo tion is the result of the absence of an appropriate vacancy, and that promotion is forthcoming with the next appropriate opening. Simila realizations or assurances are much less likely for poorer performers who are thus more likely to respond to the absence of promotion b quitting.

Table 2 presents the logit estimates of the parameters of equatio (6). Note that the overall quit rate for the year (1981) was only 2.0

percent (172/8424). Therefore, since the variance of the quit rate is quite small (.02), it is difficult to "explain" much of that variance. As hypothesized, recent promotion significantly reduces the quit probability, by approximately one percentage point (.0094) at the mean quit probability. Employees receiving any of the three highest performance ratings are significantly less likely to quit than employees who received only a satisfactory rating. Neither the relative salary variable (RSAL) nor the change in salary variable (DSAL) are significant, although each has the expected inverse relationship with the quit probability. Thus the major management rewards (and signals to employees) all have the expected impact on the quit probability.

The variables that proxy for the cost of quitting also have a significant impact on the quit probability. Employees who are married, and who have children under age 18 in the household, are significantly less likely to quit than unmarried employees or those without children. Years of service, entered in quadratic form, shows a falling quit probability until about 20.5 years of service, after which it rises gradually. This is generally consistent with the hypothesis that tenure reduces quit propensities. The rise after 20 years of service may reveal the beginning of early retirement decisions.

The variables that represent general training, educational attainment (MASTERS, DOCTORATE) and previous experience (PREVEXP), do not have a significant effect on quits. This is consistent with the choice model which indicated that these factors would effect both the expected utility of the current job and of alternative jobs.

Table 2 also shows that some major fields, functions and sala grades significantly influence the quit probability. Employees wi degrees in computer science, accounting and finance were more likely quit than employees with other degrees. However, employees in t financial and auditing division (FINAUDIT) were less likely to qui In addition, employees in the lowest salary grades were more likely quit than other employees. A likelihood ratio test was used determine whether the sets of major field and function dummy variabl were significant. Each test was significant, indicating that major a function as groups are significant factors, and supporting the su sample analysis that follows.[7]

One concern, noted above, was the possible bias that results fr unmeasured attributes correlated with both the length of servic variables and the quit probability. Although service is significantl related to the quit probability, the simple correlation is not high (= -.11), and the relationship is quantitatively small. Calculated a the mean length of service and quit probability, an additional year o service reduces the quit probability by less than four-tenths of on percent (.0037). Since the correlations between the umeasured attri butes and the other explanatory variables is unknown, it is difficul to assess the biases that may result. However, in light of the sampl restrictions and the small impact of length of service on the qui probability, they are probably not large. Perhaps the best alterna tives are to estimate quit models for cohorts having the same length o service, or a hazard function which accounts for variations in the qui

probability with length of service. These approaches are beyond the scope of this study.[8]

Table 3 presents the parameter estimates for the promotion variable for the various subsamples referred to above. As can be seen from the table, the sample was divided into three major fields of study (rather than the fourteen shown in Table 1), and four functional areas (rather than the six in Table 1). These groupings were dictated by the need to maintain reasonable sample sizes. As the sample size diminishes the likelihood of observing a significant effect falls as well, tending to bias the results in the hypothesized direction. Thus the subsamples chosen here are more heterogeneous than desired, but represent a reasonable compromise between competing constraints.

Among the major fields, Table 3 shows no effect of promotions on quits for scientists, a small but not significant impact for engineers, and a large, significant impact for business-related majors (computer science, accounting, finance and business). One interpretation of these results is that the business related majors have the best alternatives (or perhaps less commitment to the firm), and are therefore more responsive to absence of promotion than are employees in the sciences or engineering. Alternatively, if this group is more heterogeneous than the other groups, the variance of promotions might be greater, resulting in a more significant relationship with quitting. In fact, the variance of promotions is greater among business majors (.204) than among engineers (.174) or scientists (.161). However, the difference is probably too small to account for the significant effect of promotions on quitting estimated for the group.

Among the functional divisions, promotion has no effect quitting among research and marketing employees. However, there is negative but not significant effect for production employees, and significant effect for administration (finance, auditing, personnel a other) employees. Although the administration group is the mo heterogeneous, the variance of promotions among its employees is n larger than for the marketing and production groups. Thus, the great sensitivity to absence of promotion may reflect better alternatives, some unknown source of job dissatisfaction.

The performance rating subsamples estimates suggest that l performers are more sensitive than high performers to absence promotion, as expected. The two lowest performance groups have larg negative coefficients, although only for the "good" group is t relationship significant. (The lack of significance for the "satisfa tory" group may be due to the small sample size, which inflated t standard error of the coefficient.) The best performers also show so sensitivity of quitting to absence of promotion, although the effect not significant. For these "excellent" performers, the pull attractive alternatives may be especially important.

V. Conclusions

The study sought to test whether absence of recent promotio increased the likelihood of voluntary separation, and whether th promotion effect was the result of labor heterogeneity. The result clearly support the first hypothesis: a significant negative relation ship was estimated between recent promotion and quit probability. Th estimated coefficient indicated a sizeable effect; those promoted ha

almost a one point lower probability of quitting than those who were not promoted. The average quit rate of those promoted is .014, compared with .023 for those not promoted.

With respect to the heterogeneity argument, there is some support for the hypothesis. However, among the employees who majored in business related subjects, a significant promotion effect remained. If sample size limitations allowed further subdivision to individual majors, a more thorough test would be possible. Among the firm's functions, there is some evidence that absence of promotion increases quit probabilities, although only one coefficient is significant. In summary, promotion rates have a smaller effect on the more homogeneous groups of employees, although the smaller sample sizes may have influenced this outcome.

The major implication of these results is that failure to equalize promotion rates among equally able employees results in increased turnover. The need for employees to develop specific skills, not transferable within the firm, is probably unavoidable. An interesting direction for future research would be the development and testing of a model that minimized turnover cost subject to the firm's skill requirements. This, however, would require estimation of a production function with numerous distinct labor inputs.

TABLE 1

PERCENT PROMOTED BY MAJOR FIELD OF STUDY FUNCTION AND PERFORMAN RATING*

Major Field	Performance Rating 5	4	3	2
Chemical Engineering	33.5%	30.1%	24.2%	11.6%
Electrical Engineering	45.7	28.7	19.3	8.7
Mechanical Engineering	29.6	26.9	19.8	7.5
Other Engineering	30.2	26.5	14.5	0.0
Chemistry	29.4	20.0	12.7	3.4
Physics	21.7	22.6	14.5	0.0
Biology	51.1	42.9	31.2	28.6
Other Sciences	62.5	41.2	31.6	0.0
Other Technical	60.0	23.1	18.5	0.0
Math	54.2	40.3	13.6	0.0
Computer Science	70.6	41.7	26.7	0.0
Accounting	41.7	43.2	39.2	0.0
Finance	42.9	42.9	28.6	0.0
Business	37.7	32.7	21.4	4.9
Function				
Finance/Auditing	48.8%	41.1%	22.3%	0.0%
Production	36.1	31.7	23.2	7.7
Research	28.7	21.4	12.4	4.9
Personnel	34.4	30.1	21.4	0.0
Marketing	37.1	30.8	24.0	14.2
Other	37.9	25.8	18.7	1.8

* = The highest performance rating is 5, the lowest is 2.

Table 2

Logit Estimates of Quit Model

(N = 8424 ; Mean of Quit = .0204)

Variable	Mean	Beta	Standard Error	Chi-Square*
Intercept		.942	1.400	.45
$Prevexp_2$	1.736	.011	.053	.04
$Prevexp^2$	13.275	-.002	.003	.58
$Service_2$	13.600	-.275	.062	19.51
$Service^2$	225.577	.007	.002	9.51
Masters	.216	-.316	.222	2.02
Doctorate	.205	-.329	.309	1.13
Salary Ratio	1.001	- .554	1.328	.17
Salary Change	.412	-1.082	.696	2.42
Married	.903	- .457	.217	4.44
Children	.657	- .558	.195	8.22
PERFORMANCE = 3	.325	- .792	.244	10.55
PERFORMANCE = 4	.438	-1.281	.263	23.65
PEPFORMANCE = 5	.173	-1.011	.318	10.08
Promoted	.227	- .511	.226	5.10
Fin/Audit	.060	-1.110	.534	4.31
Production	.296	.148	.225	.43
Personnel	.030	- .185	.614	.09
Research	.173	.147	.314	.22
Marketing	.194	.409	.250	2.68
Comp. Science	.004	1.364	.653	4.37
Accounting	.015	1.290	.578	4.99
Finance	.004	2.145	.689	9.68
Technician	.004	.317	.818	.15
Math	.015	.660	.603	1.20
Business	.145	- .228	.381	.36
Sciences	.271	- .271	.349	.61
Engineering	.485	- .116	.330	.12
Grade 1 or 2	.006	1.157	.447	6.70
Grade 3	.042	.285	.275	1.08

* Wald (MLE) Chi-square statistic = $(Beta/Standard\ error)^2$. Values greater than 3.84 indicate significance at the .05 level for a two-tailed test.

Table 3

Logit Estimates of Promotion Effect on Quit Probability by Majo
Field, Function, Salary Grade and Performance Rating

Group	N	Percent Promoted	Beta	Std. Error	Chi-Square
Major Field					
Engineering	4088	22.4	-.619	.326	3.61
Sciences	2446	20.2	-.123	.442	.08
Business [a]	1410	28.4	-1.346	.606	4.94
Function					
Administration [b]	2833	23.5	-1.137	.533	4.55
Production	2498	22.9	- .706	.396	3.19
Research	1456	18.8	- .302	.619	.24
Marketing	1637	24.7	- .105	.420	.06
Performance Rating					
Satisfactory (2)	535	3.2	-1.467	1.362	1.16
Good (3)	2736	17.2	-1.273	.472	7.28
Very Good (4)	3695	25.6	.087	.334	.07
Excellent (5)	1458	33.0	- .668	.534	1.56

[a] Includes computer science, accounting, finance and business

[b] Includes Financial/Auditing, Personnel, and other

References

Arnold, H. and D. Feldman, "A Multivariate Analysis of the Determinants of Job Turnover," Journal of Applied Psychology, Vol. 67, 1982, pp. 350-360

Blau, F. And L. Kahn, "Race and Sex Differences in Quits by Younger Workers," Industrial and Labor Relations Review, Vol 34, No. 4, 1981, pp. 563-577

Dreher, G.F., "The Role of Performance in the Turnover Process," Academy of Management Journal, Vol 25, 1982, pp. 137-147.

Jovanovic, B, "Job Matching and The Theory of Turnover," Journal of Political Economy, vol. 87, No.5 1979, pp. 972-990.

Keller, R.T. , "The Role of Performance and Absenteeism in the Prediction of Turnover," Academy of Management Journal, Vol 27, No.1, 1984, pp. 176-183.

Meitzen, M., "Differences in Male and Female Job Quitting Behavior," Journal of Labor Economics, Vol 17, No.2, 1986, pp. 151-167.

Mincer, J. and B. Jovanovic, "Labor Mobility and Wages," in Studies in Labor Markets, Edited by Sherwin Rosen, U. of Chicago Press, 1981.

Miller, R., "Job Matching and Occupational Choice," Journal of Political Economy, Vol. 92, No. 6, 1984, pp. 1086-1120.

Mitchell, O., "Fringe Benefits and the Cost of Changing Jobs" Industrial and Labor Relations Review, Vol. 37, No. 1, 1983, pp.70-78

Mitchell, O., "Fringe Benefits and Labor Mobility," The Journal of Human Resources, Vol 17, No. 2, 1982, pp. 286-298.

Parsons, D., 'Models of Labor Market Turnover," in Research in Labor Economics I. Edited by R.G. Ehrenberg, JAI Press, 1977.

Scholl, R. "Career Lines and Employment Stability," Academy of Management Journal, Vol. 26, No. 1, 1983, pp. 86-103.

Viscusi, W., "Sex Differences in Worker Quitting," Review of Economics and Statistics, Vol. 62, No. 3, 1980, pp. 388-398.

Weiss, A., "Determinants of Quit Behavior," Journal of Labor Economics, Vol. 2, No. 3, 1984, pp. 371-387.

Wise, D., "Personal Attributes, Job Performance and Probability of Promotion," Econometrica, Vol. 43, 1975, pp. 913-931.

Footnotes

1. In general, previous research has either used more aggregated da or data from multiple employers, studied blue collar workers, r focused on job satisfaction indicators obtained from employe surveys. These approaches to quit behavior are reviewed below.

2. The following discussion loosely follows Weiss.

3. Eligible here means employed in a position which qualifies t incumbent for the vacancy.

4. One might argue that specific training differences become le important at higher managerial levels, and thus that location the firms hierarchy is also a segmentation factor. In this stu high level executives and managers were deleted from the sampl Within the sample there was no systematic variation in promoti rates across salary grades.

5. Tabulation of quit rates by years of service reveals that the ra is over 7% for the first three years, falls to an average of abo 2.0% for three through 24 years, rises to 5% for years 25 throu 33, and averages about 29 percent for employees with more than years of service.

6. Discussions with the personnel department of the firm confirmed judgment regarding the low-rated performers. Separation codes these data are not an accurate means of determining separati reason. However, the firm has a policy of terminating, or askin for the resignation of only these employees who are rated a unsatisfactory.

7. The procedure used was to estimate the model without the set of dummy variables. The difference in - 2 (log likelihood) between the full and the restricted models follows a chi-square distribution with degrees of freedom = number of omitted variables. For the major field dummies the calculated figure is 21.86 (8), significant at p = .01; for the functions the figure is 11.10 (5), significant at p = .05.

8. The author will pursue these alternatives in future research.

Distribution List

Agency	No. of copies
Defense Technical Information Center Cameron Station Alexandria, VA 22314	2
Aline Questor Center for Naval Analyses 4401 Ford Ave. P. O. Box 18288 Alexandria, VA 22302	1
Dudley Knox Library, Code 0142 Naval Postgraduate School Monterey, CA 93943	2
Office of Research Administration Code 012 Naval Postgraduate School Monterey, CA 93943	1
Professor Loren M. Solnick Dept. of Administrative Sciences Naval Postgraduate School Monterey, CA 93943	5
Department of Administrative Sciences Naval Postgraduate School Monterey, CA 93943	1
Chief of Naval Research 800 N. Quincy Street Arlington, VA 22217-5000	2